



PHOENIX
TECHNOLOGY SERVICES

COG Operating LLC

Eddy County, NM (NAD27 NME)

SRO State Com

#63H

WB1/Job #1410518

Survey: Phoenix MWD Survey

Standard Survey Report

27 May, 2014

NM OIL CONSERVATION
ARTESIA DISTRICT

AUG 04 2014

RECEIVED

15-41742





Phoenix Technology Services
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #63H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3037.90usft (Scandril Freedom)
Site:	SRO State Com	MD Reference:	KB @ 3037.90usft (Scandril Freedom)
Well:	#63H	North Reference:	Grid
Wellbore:	WB1/Job #1410518	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Scandril Freedom)	Database:	Compass 5000 GCR DB

Project	Eddy County, NM (NAD27 NME)		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	SRO State Com				
Site Position:		Northing:	386,965.90 usft	Latitude:	32° 3' 49.36391 N
From:	Map	Easting:	564,751.00 usft	Longitude:	104° 7' 27.51995 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.11 °

Well	#63H, 2450' FNL & 660' FWL					
Well Position	+N/-S	0.00 usft	Northing:	384,742.00 usft	Latitude:	32° 3' 27.07107 N
	+E/-W	0.00 usft	Easting:	578,173.00 usft	Longitude:	104° 4' 51.60270 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,011.90 usft

Wellbore	WB1/Job #1410518				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010_14	2014/05/15	7.45	59.87	48,172

Design	Surveys (Scandril Freedom)				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	179.34	

Survey Program	Date 2014/05/27			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
115.00	15,676.00	Phoenix MWD Survey (WB1/Job #141051)	MWD	MWD - Standard

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
115.00	0.70	299.70	115.00	0.35	-0.61	-0.36	0.61	0.61	0.00	
First Phoenix MWD Survey										
209.00	0.80	331.00	208.99	1.21	-1.43	-1.22	0.44	0.11	33.30	
323.00	1.70	7.90	322.96	3.58	-1.58	-3.60	1.02	0.79	32.37	
375.00	2.10	7.90	374.93	5.29	-1.34	-5.30	0.77	0.77	0.00	
452.00	2.30	14.40	451.88	8.18	-0.77	-8.19	0.41	0.26	8.44	
545.00	2.20	12.40	544.81	11.73	0.08	-11.73	0.14	-0.11	-2.15	
637.00	1.80	353.30	636.75	14.89	0.29	-14.89	0.84	-0.43	-20.76	
734.00	0.60	0.80	733.73	16.91	0.12	-16.91	1.25	-1.24	7.73	
797.00	0.90	340.30	796.72	17.71	-0.04	-17.71	0.63	0.48	-32.54	



Phoenix Technology Services
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #63H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3037.90usft (Scandril Freedom)
Site:	SRO State Com	MD Reference:	KB @ 3037.90usft (Scandril Freedom)
Well:	#63H	North Reference:	Grid
Wellbore:	WB1/Job #1410518	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Scandril Freedom)	Database:	Compass 5000 GCR DB

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
892.00	0.90	280.20	891.71	18.54	-1.03	-18.55	0.95	0.00	-63.26
987.00	1.00	247.30	986.70	18.35	-2.53	-18.38	0.58	0.11	-34.63
1,081.00	1.50	251.60	1,080.68	17.65	-4.45	-17.70	0.54	0.53	4.57
1,175.00	1.30	238.10	1,174.65	16.70	-6.52	-16.77	0.41	-0.21	-14.36
1,270.00	1.20	252.80	1,269.63	15.83	-8.39	-15.93	0.35	-0.11	15.47
1,365.00	1.70	256.40	1,364.60	15.21	-10.71	-15.33	0.53	0.53	3.79
1,459.00	1.80	247.50	1,458.55	14.31	-13.43	-14.47	0.31	0.11	-9.47
1,554.00	1.20	215.70	1,553.52	12.94	-15.39	-13.11	1.06	-0.63	-33.47
1,649.00	1.00	221.20	1,648.50	11.50	-16.51	-11.69	0.24	-0.21	5.79
1,743.00	0.70	237.40	1,742.49	10.58	-17.54	-10.78	0.41	-0.32	17.23
1,838.00	0.50	258.70	1,837.49	10.18	-18.43	-10.40	0.31	-0.21	22.42
1,933.00	0.30	40.90	1,932.49	10.29	-18.67	-10.50	0.80	-0.21	149.68
2,028.00	0.40	38.10	2,027.49	10.74	-18.31	-10.95	0.11	0.11	-2.95
2,122.00	1.00	59.20	2,121.48	11.42	-17.40	-11.62	0.68	0.64	22.45
2,217.00	2.20	68.10	2,216.44	12.52	-15.00	-12.69	1.29	1.26	9.37
2,312.00	2.20	73.80	2,311.37	13.71	-11.55	-13.84	0.23	0.00	6.00
2,406.00	0.70	78.70	2,405.34	14.33	-9.26	-14.43	1.60	-1.60	5.21
2,480.00	0.70	41.30	2,479.33	14.76	-8.52	-14.85	0.61	0.00	-50.54
2,575.00	0.60	36.00	2,574.33	15.59	-7.84	-15.68	0.12	-0.11	-5.58
2,669.00	0.70	32.70	2,668.32	16.47	-7.24	-16.56	0.11	0.11	-3.51
2,764.00	0.60	35.80	2,763.31	17.37	-6.64	-17.44	0.11	-0.11	3.26
2,859.00	0.70	21.10	2,858.31	18.31	-6.14	-18.38	0.20	0.11	-15.47
2,953.00	0.70	35.20	2,952.30	19.32	-5.60	-19.38	0.18	0.00	15.00
3,048.00	0.60	34.30	3,047.29	20.20	-4.98	-20.26	0.11	-0.11	-0.95
3,143.00	0.30	32.30	3,142.29	20.82	-4.57	-20.87	0.32	-0.32	-2.11
3,238.00	0.50	51.60	3,237.29	21.29	-4.11	-21.34	0.25	0.21	20.32
3,333.00	0.40	53.00	3,332.29	21.75	-3.52	-21.79	0.11	-0.11	1.47
3,427.00	0.30	66.00	3,426.28	22.04	-3.04	-22.08	0.14	-0.11	13.83
3,522.00	0.30	83.80	3,521.28	22.17	-2.56	-22.20	0.10	0.00	18.74
3,617.00	0.30	65.80	3,616.28	22.30	-2.09	-22.32	0.10	0.00	-18.95
3,712.00	0.40	85.10	3,711.28	22.43	-1.53	-22.45	0.16	0.11	20.32
3,806.00	0.50	71.00	3,805.28	22.59	-0.82	-22.60	0.16	0.11	-15.00
3,900.00	0.90	240.00	3,899.27	22.36	-1.07	-22.37	1.48	0.43	179.79
3,994.00	1.20	236.80	3,993.26	21.45	-2.53	-21.48	0.33	0.32	-3.40
4,089.00	1.10	232.80	4,088.24	20.35	-4.09	-20.40	0.13	-0.11	-4.21
4,183.00	1.10	234.90	4,182.22	19.29	-5.55	-19.35	0.04	0.00	2.23
4,278.00	0.80	253.00	4,277.21	18.57	-6.93	-18.65	0.44	-0.32	19.05
4,372.00	0.80	271.30	4,371.20	18.39	-8.21	-18.49	0.27	0.00	19.47
4,467.00	0.70	261.50	4,466.19	18.32	-9.45	-18.43	0.17	-0.11	-10.32
4,561.00	0.90	240.50	4,560.18	17.88	-10.66	-18.00	0.37	0.21	-22.34
4,655.00	0.80	239.10	4,654.17	17.17	-11.86	-17.31	0.11	-0.11	-1.49
4,750.00	1.00	237.20	4,749.16	16.39	-13.13	-16.54	0.21	0.21	-2.00
4,844.00	1.20	226.40	4,843.14	15.26	-14.53	-15.43	0.31	0.21	-11.49



Phoenix Technology Services
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #63H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3037.90usft (Scandrill Freedom)
Site:	SRO State Corn	MD Reference:	KB @ 3037.90usft (Scandrill Freedom)
Well:	#63H	North Reference:	Grid
Wellbore:	WB1/Job #1410518	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Scandrill Freedom)	Database:	Compass 5000 GCR DB

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
4,939.00	1.60	217.20	4,938.11	13.52	-16.05	-13.70	0.48	0.42	-9.68	
5,033.00	1.40	196.50	5,032.08	11.37	-17.17	-11.57	0.61	-0.21	-22.02	
5,128.00	0.70	236.10	5,127.07	9.94	-17.98	-10.14	1.02	-0.74	41.68	
5,223.00	0.70	272.20	5,222.06	9.64	-19.05	-9.85	0.46	0.00	38.00	
5,317.00	0.60	260.40	5,316.06	9.58	-20.11	-9.81	0.18	-0.11	-12.55	
5,412.00	0.40	239.80	5,411.05	9.33	-20.88	-9.57	0.28	-0.21	-21.68	
5,507.00	0.40	222.00	5,506.05	8.91	-21.39	-9.16	0.13	0.00	-18.74	
5,602.00	0.70	201.30	5,601.04	8.13	-21.82	-8.38	0.37	0.32	-21.79	
5,696.00	0.70	198.20	5,695.04	7.04	-22.21	-7.30	0.04	0.00	-3.30	
5,790.00	0.80	184.10	5,789.03	5.84	-22.44	-6.10	0.22	0.11	-15.00	
5,884.00	0.90	190.40	5,883.02	4.46	-22.62	-4.72	0.15	0.11	6.70	
5,979.00	1.10	190.30	5,978.01	2.83	-22.92	-3.10	0.21	0.21	-0.11	
6,074.00	0.10	224.90	6,073.00	1.88	-23.14	-2.14	1.07	-1.05	36.42	
6,168.00	0.40	304.10	6,167.00	2.00	-23.47	-2.27	0.42	0.32	84.26	
6,263.00	0.70	291.90	6,261.99	2.41	-24.28	-2.68	0.34	0.32	-12.84	
6,358.00	1.40	281.50	6,356.98	2.85	-25.96	-3.15	0.76	0.74	-10.95	
6,453.00	0.70	294.30	6,451.96	3.32	-27.62	-3.64	0.77	-0.74	13.47	
6,548.00	0.20	287.60	6,546.96	3.61	-28.31	-3.94	0.53	-0.53	-7.05	
6,643.00	0.40	218.20	6,641.96	3.40	-28.67	-3.73	0.40	0.21	-73.05	
6,737.00	0.40	221.70	6,735.95	2.90	-29.09	-3.23	0.03	0.00	3.72	
6,831.00	0.40	308.90	6,829.95	2.86	-29.57	-3.20	0.59	0.00	92.77	
6,925.00	0.50	281.70	6,923.95	3.15	-30.22	-3.50	0.25	0.11	-28.94	
7,019.00	0.70	291.30	7,017.94	3.44	-31.16	-3.80	0.24	0.21	10.21	
7,113.00	0.90	280.20	7,111.94	3.78	-32.42	-4.15	0.27	0.21	-11.81	
7,208.00	0.50	257.30	7,206.93	3.82	-33.56	-4.21	0.51	-0.42	-24.11	
7,303.00	0.30	231.00	7,301.93	3.57	-34.16	-3.97	0.28	-0.21	-27.68	
7,397.00	0.40	254.20	7,395.92	3.33	-34.66	-3.73	0.18	0.11	24.68	
7,455.00	0.30	255.80	7,453.92	3.24	-35.01	-3.64	0.17	-0.17	2.76	
7,492.00	0.20	98.10	7,490.92	3.20	-35.04	-3.61	1.33	-0.27	-426.22	
7,524.00	1.70	149.70	7,522.92	2.79	-34.74	-3.19	4.95	4.69	161.25	
7,555.00	6.00	156.60	7,553.84	0.90	-33.87	-1.29	13.93	13.87	22.26	
7,587.00	9.10	166.40	7,585.56	-3.09	-32.61	2.72	10.46	9.69	30.63	
7,618.00	10.90	173.10	7,616.09	-8.39	-31.68	8.02	6.90	5.81	21.61	
7,650.00	12.00	177.00	7,647.45	-14.71	-31.14	14.35	4.20	3.44	12.19	
7,682.00	13.80	185.30	7,678.65	-21.84	-31.32	21.47	8.06	5.63	25.94	
7,713.00	16.90	188.40	7,708.54	-29.98	-32.32	29.60	10.34	10.00	10.00	
7,744.00	19.40	190.40	7,737.99	-39.50	-33.91	39.11	8.31	8.06	6.45	
7,776.00	22.20	186.90	7,767.91	-50.73	-35.59	50.32	9.57	8.75	-10.94	
7,807.00	25.80	184.60	7,796.22	-63.28	-36.84	62.85	12.00	11.61	-7.42	
7,841.00	29.60	182.60	7,826.32	-79.04	-37.81	78.60	11.50	11.18	-5.88	
7,872.00	33.80	182.40	7,852.69	-95.32	-38.52	94.87	13.55	13.55	-0.65	
7,903.00	37.70	181.60	7,877.84	-113.41	-39.15	112.95	12.67	12.58	-2.58	
7,935.00	41.80	181.50	7,902.44	-133.86	-39.70	133.40	12.81	12.81	-0.31	



Phoenix Technology Services
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #63H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3037.90usft (Scandrill Freedom)
Site:	SRO State Com	MD Reference:	KB @ 3037.90usft (Scandrill Freedom)
Well:	#63H	North Reference:	Grid
Wellbore:	WB1/Job #1410518	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Scandrill Freedom)	Database:	Compass 5000 GCR DB

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
7,967.00	43.40	182.30	7,926.00	-155.51	-40.42	155.03	5.28	5.00	2.50
7,999.00	46.40	181.80	7,948.66	-178.08	-41.23	177.59	9.44	9.38	-1.56
8,030.00	49.00	179.10	7,969.52	-201.00	-41.39	200.51	10.57	8.39	-8.71
8,062.00	52.40	177.50	7,989.79	-225.75	-40.65	225.27	11.31	10.63	-5.00
8,093.00	55.90	176.30	8,007.94	-250.83	-39.29	250.37	11.72	11.29	-3.87
8,125.00	59.70	176.90	8,024.99	-277.86	-37.68	277.41	11.98	11.88	1.88
8,156.00	64.00	177.80	8,039.61	-305.16	-36.43	304.72	14.10	13.87	2.90
8,188.00	67.90	178.80	8,052.65	-334.36	-35.56	333.93	12.52	12.19	3.13
8,220.00	72.30	180.20	8,063.54	-364.44	-35.31	364.01	14.35	13.75	4.38
8,251.00	76.80	180.20	8,071.80	-394.31	-35.41	393.88	14.52	14.52	0.00
8,283.00	81.00	180.20	8,077.96	-425.71	-35.52	425.27	13.13	13.13	0.00
8,314.00	83.90	180.30	8,082.03	-456.43	-35.65	455.99	9.36	9.35	0.32
8,341.00	86.50	180.20	8,084.29	-483.34	-35.77	482.89	9.64	9.63	-0.37
8,404.00	90.20	180.60	8,086.10	-546.30	-36.21	545.84	5.91	5.87	0.63
8,499.00	91.20	180.90	8,084.94	-641.28	-37.45	640.81	1.10	1.05	0.32
8,594.00	90.20	180.90	8,083.78	-736.26	-38.95	735.76	1.05	-1.05	0.00
8,688.00	89.70	180.80	8,083.86	-830.25	-40.34	829.73	0.54	-0.53	-0.11
8,783.00	90.40	180.90	8,083.78	-925.24	-41.75	924.70	0.74	0.74	0.11
8,878.00	91.40	180.90	8,082.29	-1,020.21	-43.24	1,019.65	1.05	1.05	0.00
8,972.00	90.40	180.60	8,080.81	-1,114.19	-44.47	1,113.61	1.11	-1.06	-0.32
9,067.00	89.60	180.00	8,080.81	-1,209.19	-44.97	1,208.59	1.05	-0.84	-0.63
9,161.00	91.40	179.80	8,079.99	-1,303.18	-44.81	1,302.58	1.93	1.91	-0.21
9,256.00	89.80	180.30	8,079.00	-1,398.18	-44.89	1,397.57	1.76	-1.68	0.53
9,350.00	88.60	180.20	8,080.31	-1,492.16	-45.30	1,491.54	1.28	-1.28	-0.11
9,445.00	88.40	179.40	8,082.80	-1,587.13	-44.97	1,586.51	0.87	-0.21	-0.84
9,540.00	88.30	178.60	8,085.53	-1,682.07	-43.31	1,681.46	0.85	-0.11	-0.84
9,634.00	89.70	178.10	8,087.17	-1,776.02	-40.60	1,775.43	1.58	1.49	-0.53
9,729.00	91.40	177.80	8,086.26	-1,870.95	-37.21	1,870.40	1.82	1.79	-0.32
9,823.00	91.60	179.40	8,083.80	-1,964.89	-34.91	1,964.35	1.71	0.21	1.70
9,918.00	89.60	180.20	8,082.81	-2,059.88	-34.58	2,059.34	2.27	-2.11	0.84
10,012.00	88.60	180.60	8,084.28	-2,153.86	-35.23	2,153.31	1.15	-1.06	0.43
10,107.00	89.80	180.40	8,085.61	-2,248.85	-36.06	2,248.28	1.28	1.26	-0.21
10,201.00	91.50	180.40	8,084.54	-2,342.83	-36.72	2,342.26	1.81	1.81	0.00
10,296.00	90.80	179.90	8,082.64	-2,437.81	-36.97	2,437.23	0.91	-0.74	-0.53
10,390.00	89.30	179.10	8,082.55	-2,531.81	-36.15	2,531.22	1.81	-1.60	-0.85
10,485.00	89.00	179.80	8,083.96	-2,626.79	-35.24	2,626.21	0.80	-0.32	0.74
10,580.00	89.60	179.30	8,085.12	-2,721.78	-34.49	2,721.20	0.82	0.63	-0.53
10,675.00	90.90	179.20	8,084.71	-2,816.77	-33.25	2,816.20	1.37	1.37	-0.11
10,770.00	91.30	177.90	8,082.89	-2,911.72	-30.84	2,911.17	1.43	0.42	-1.37
10,864.00	91.00	176.70	8,081.00	-3,005.59	-26.42	3,005.09	1.32	-0.32	-1.28
10,958.00	89.20	176.30	8,080.83	-3,099.41	-20.68	3,098.97	1.96	-1.91	-0.43
11,053.00	90.10	176.20	8,081.41	-3,194.21	-14.46	3,193.83	0.95	0.95	-0.11
11,147.00	91.80	176.30	8,079.86	-3,287.99	-8.32	3,287.68	1.81	1.81	0.11
11,241.00	91.00	177.70	8,077.56	-3,381.83	-3.40	3,381.57	1.71	-0.85	1.49



Phoenix Technology Services
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #63H
Project:	Eddy County, NM (NAD27-NME)	TVD Reference:	KB @ 3037.90usft (Scandrill Freedom)
Site:	SRO State Corn	MD Reference:	KB @ 3037.90usft (Scandrill Freedom)
Well:	#63H	North Reference:	Grid
Wellbore:	WB1/Job #1410518	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Scandrill Freedom)	Database:	Compass 5000 GCR DB

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
11,335.00	89.40	177.30	8,077.23	-3,475.74	0.70	3,475.51	1.75	-1.70	-0.43
11,429.00	88.20	177.50	8,079.20	-3,569.62	4.96	3,569.44	1.29	-1.28	0.21
11,523.00	89.40	177.50	8,081.17	-3,663.51	9.06	3,663.37	1.28	1.28	0.00
11,618.00	91.30	177.50	8,080.59	-3,758.41	13.21	3,758.31	2.00	2.00	0.00
11,712.00	91.10	178.20	8,078.62	-3,852.32	16.73	3,852.26	0.77	-0.21	0.74
11,806.00	88.70	178.00	8,078.78	-3,946.26	19.85	3,946.23	2.56	-2.55	-0.21
11,900.00	90.80	179.30	8,079.19	-4,040.23	22.06	4,040.22	2.63	2.23	1.38
11,994.00	90.50	179.30	8,078.13	-4,134.22	23.21	4,134.21	0.32	-0.32	0.00
12,088.00	89.20	177.90	8,078.37	-4,228.18	25.51	4,228.20	2.03	-1.38	-1.49
12,182.00	90.30	177.30	8,078.78	-4,322.10	29.44	4,322.15	1.33	1.17	-0.64
12,276.00	91.80	176.80	8,077.06	-4,415.95	34.28	4,416.06	1.68	1.60	-0.53
12,370.00	90.10	177.30	8,075.50	-4,509.81	39.12	4,509.97	1.89	-1.81	0.53
12,464.00	89.70	177.50	8,075.67	-4,603.72	43.38	4,603.91	0.48	-0.43	0.21
12,559.00	91.40	177.60	8,074.76	-4,698.62	47.44	4,698.86	1.79	1.79	0.11
12,653.00	90.20	177.10	8,073.44	-4,792.51	51.79	4,792.79	1.38	-1.28	-0.53
12,747.00	89.90	177.20	8,073.36	-4,886.39	56.46	4,886.72	0.34	-0.32	0.11
12,856.00	90.00	177.50	8,073.46	-4,995.28	61.50	4,995.65	0.29	0.09	0.28
12,950.00	87.60	177.30	8,075.42	-5,089.15	65.76	5,089.57	2.56	-2.55	-0.21
13,044.00	86.60	177.60	8,080.18	-5,182.94	69.94	5,183.40	1.11	-1.06	0.32
13,139.00	87.00	177.90	8,085.48	-5,277.72	73.66	5,278.21	0.53	0.42	0.32
13,233.00	92.20	178.50	8,086.14	-5,371.64	76.62	5,372.16	5.57	5.53	0.64
13,327.00	91.70	177.20	8,082.94	-5,465.51	80.14	5,466.07	1.48	-0.53	-1.38
13,421.00	92.20	177.10	8,079.74	-5,559.34	84.81	5,559.95	0.54	0.53	-0.11
13,515.00	91.90	176.10	8,076.38	-5,653.11	90.38	5,653.78	1.11	-0.32	-1.06
13,609.00	91.00	178.10	8,074.00	-5,746.96	95.14	5,747.67	2.33	-0.96	2.13
13,703.00	88.70	180.20	8,074.25	-5,840.94	96.53	5,841.66	3.31	-2.45	2.23
13,797.00	90.00	180.90	8,075.31	-5,934.92	95.63	5,935.63	1.57	1.38	0.74
13,891.00	90.40	180.60	8,074.98	-6,028.91	94.40	6,029.60	0.53	0.43	-0.32
13,985.00	87.60	179.20	8,076.62	-6,122.89	94.56	6,123.57	3.33	-2.98	-1.49
14,079.00	90.00	179.80	8,078.59	-6,216.86	95.38	6,217.54	2.63	2.55	0.64
14,174.00	90.20	179.40	8,078.43	-6,311.85	96.04	6,312.54	0.47	0.21	-0.42
14,268.00	90.80	177.90	8,077.61	-6,405.82	98.26	6,406.53	1.72	0.64	-1.60
14,362.00	89.90	175.90	8,077.03	-6,499.68	103.34	6,500.44	2.33	-0.96	-2.13
14,456.00	89.20	175.60	8,077.77	-6,593.41	110.31	6,594.25	0.81	-0.74	-0.32
14,550.00	91.10	175.60	8,077.53	-6,687.13	117.52	6,688.04	2.02	2.02	0.00
14,644.00	91.00	174.20	8,075.80	-6,780.74	125.87	6,781.74	1.49	-0.11	-1.49
14,738.00	90.80	176.40	8,074.33	-6,874.41	133.57	6,875.49	2.35	-0.21	2.34
14,832.00	91.60	179.40	8,072.36	-6,968.31	137.02	6,969.43	3.30	0.85	3.19
14,926.00	91.40	181.40	8,069.90	-7,062.27	136.36	7,063.38	2.14	-0.21	2.13
15,021.00	92.40	181.70	8,066.75	-7,157.19	133.79	7,158.25	1.10	1.05	0.32
15,115.00	91.80	182.80	8,063.30	-7,251.05	130.11	7,252.07	1.33	-0.64	1.17
15,209.00	90.30	182.80	8,061.58	-7,344.92	125.51	7,345.88	1.60	-1.60	0.00
15,303.00	89.60	181.80	8,061.66	-7,438.84	121.74	7,439.75	1.30	-0.74	-1.06



Phoenix Technology Services
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #63H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3037.90usft (Scandriil Freedom)
Site:	SRO State Com	MD Reference:	KB @ 3037.90usft (Scandriil Freedom)
Well:	#63H	North Reference:	Grid
Wellbore:	WB1/Job #1410518	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Scandriil Freedom)	Database:	Compass 5000 GCR DB

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
15,397.00	90.00	181.00	8,061.99	-7,532.81	119.45	7,533.69	0.95	0.43	-0.85	
15,491.00	89.60	180.80	8,062.32	-7,626.80	117.97	7,627.65	0.48	-0.43	-0.21	
15,586.00	89.30	180.20	8,063.23	-7,721.79	117.14	7,722.63	0.71	-0.32	-0.63	
15,625.00	89.60	179.80	8,063.60	-7,760.79	117.14	7,761.62	1.28	0.77	-1.03	
Final Phoenix MWD Survey										
15,676.00	89.60	179.80	8,063.96	-7,811.79	117.32	7,812.62	0.00	0.00	0.00	
Projection to TD										

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
115.00	115.00	0.35	-0.61	First Phoenix MWD Survey	
15,625.00	8,063.60	-7,760.79	117.14	Final Phoenix MWD Survey	
15,676.00	8,063.96	-7,811.79	117.32	Projection to TD	

Checked By: _____	Approved By: _____	Date: _____
-------------------	--------------------	-------------



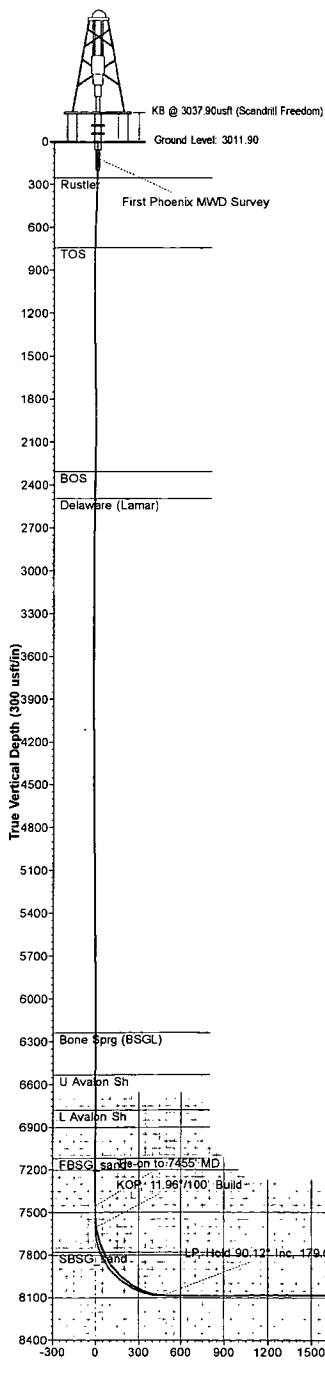
Project: Eddy County, NM (NAD27 NME)
Site: SRO State Com
Well: #63H
Wellbore: WB1/Job #1410518
Design: Plan #3B 05-15-14
Rig: Scandril Freedom



PHOENIX
TECHNOLOGY SERVICES



Azimuths to Grid North
True North: -0.13°
Magnetic North: 7.32°
Magnetic Field
Strength: 48172.1nT
Dip Angle: 59.87°
Date: 2014/05/15
Model: IGRF2010_14



WELL DETAILS									
				Ground Level:	3011.90				
+N/-S	+E/-W	Northing	Ground Level:	Eastings	Latitude	Longitude			
0.00	0.00	384742.00	578173.00	32° 3' 27.07107° N	104° 4' 51.60270° W				

SECTION DETAILS									
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSeal
1	7455.00	0.30	255.80	7453.92	3.24	-35.01	0.00	0.00	-3.64
2	7607.50	0.30	255.80	7606.42	3.04	-35.78	0.00	0.00	-3.45
3	8360.53	90.12	179.06	8084.97	-477.04	-30.36	11.96	-76.74	476.66
4	15730.69	90.12	179.06	8070.00	-7846.20	90.30	0.00	0.00	7846.72

DESIGN TARGET DETAILS									
Name	TVD	+N/-S	+E/-W	Northing	Eastings	Latitude	Longitude	Shape	
PBHL-SRO State Com #63H v2	8070.00	-7846.20	90.30	376895.80	578263.30	32° 2' 9.41853° N	104° 4' 50.78684° W	Point	
-plan hits target center									

LEGEND	
—	#64H, WB1/Job #1410531, Surveys (Scandril Freedom) V0
—	#63H, WB1/Job #1410518, Surveys (Scandril Freedom) V0
—	Plan #3B 05-15-14

Map System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone Name: New Mexico East 3001
Local Origin: Well #63H, Grid North
Latitude: 32° 3' 27.07107° N
Longitude: 104° 4' 51.60270° W
Grid East: 578173.00
Grid North: 384742.00
Scale Factor: 1.000
Geomagnetic Model: IGRF2010_14
Sample Date: 15-May-14
Magnetic Declination: 7.45°
Dip Angle from Horizontal: 59.87°
Magnetic Field Strength: 48172
To convert a Magnetic Direction to a Grid Direction, Add 7.32°
To convert a Magnetic Direction to a True Direction, Add 7.45° East
To convert a True Direction to a Grid Direction, Subtract 0.13°

FORMATION TOP DETAILS				
TVDPath	MDPath	Formation	DipAngle	DipDir
7781.00	7786.24	SBSGL sand		

